

FIG. 2 is a perspective view intended to explain the method of attaching fixing plates in the first embodiment of the braille cell according to the present invention;

FIGS. 3A and 3B are sectional views showing tactile sections partially enlarged in braille cells according to first, second and third, fourth embodiments of the present invention;

FIG. 4 is a perspective view intended to explain how the tactile section is detachably attached to the base in the case of the first embodiment of the present invention;

FIG. 5 is a side view showing the tactile section in the first embodiment of the present invention;

FIG. 6 is a perspective view showing the second embodiment of the present invention wherein the structure for detachably attaching the tactile section to the base is different from that in the first embodiment;

FIG. 7 is a perspective view showing the third embodiment of the present invention wherein the tactile section having no cap is made detachable; and

FIG. 8 is a perspective view showing the fourth embodiment of the present invention wherein the tactile section having no cap is made detachable.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The braille cell according to a first embodiment of the present invention will be described in detail with reference to the accompanying drawings.

The first embodiment of the present invention will be described referring to FIGS. 1A, 1B, 2 and 3A. FIGS. 1A and 1B are plan and side views showing the braille cell according to the first embodiment of the present invention. Reference numeral 1 represents a base body and this base body 1 is made thick at its top and bottom 1a and 1b while a partition plate 1c for connecting the top 1a and the bottom 1b of the base body 1 to each other is made so thin as to allow side grooves for housing piezoelectric element reeds 2 therein to be formed at both sides of the partition plate 1c. Stoppers 1d for controlling the piezoelectric element reeds 2 not to be displaced by impact or the like to such an extent that the piezoelectric element reeds 2 are broken by their own displacement, and fulcrums 1e for increasing the pushing force exerted by tactile pins are projected from both sides of the partition plate 1c. Further, the bottom 1b of the base body 1 is also provided with a fulcrum 1e which is used for the lowest piezoelectric element reeds 2.

In order that the plural piezoelectric element reeds 2 are housed at a certain interval and in a step on both sides of the partition plate 1c of the base body 1, base ends 2a of the piezoelectric element reeds 2 are fixed to both sides of a printed circuit board 3 by soldering and this printed circuit board 3 is detachably fixed to the base body 1, using fixing holes 1f formed at the top 1a and bottom 1b of the base body 1 and spring pins 1g shown in FIG. 2.

As shown in FIGS. 1 and 2, through-holes 1h are formed at the sides of the top 1a and bottom 1b of the base body 1, and a shallow groove 1i extending from the through-hole 1h at the side of the top 1a to the through-hole 1h at the side of the bottom 1b is formed on both sides of base body 1. A fixing plate 4 is fitted onto each of the sides of the base body 1, using the through-holes 1h and the shallow groove 1i, and these paired fixing plates 4 thus fitted onto the both sides of the base body

1 serve to limit left and right movements of each of the piezoelectric element reeds 2, which are housed on the both sides of the partition plate 1c, relative to the base body 1.

The partition plate 1c is also provided with a ventilation window 1p which allows the piezoelectric element reeds 2 on the both sides of the partition plate 1c to be confirmed and which enables the convection radiation of air to be enhanced.

As shown in FIG. 2, the fixing plates 4 on left and right sides of the base body 1 form pair and these paired fixing plates 4 are fitted to each other by their projections 4a on the sides thereof and their protruded holes 4b formed on the sides thereof to correspond to their projections 4a, so that the piezoelectric element reeds 2 on the both sides of the partition plate 1c can be defined in left and right directions by these paired fixing plates 4.

A tactile section 5 is detachably attached to the top 1a and bottom 1b of the base body 1 at the front or left ends thereof as shown in FIG. 1 and tactile pins 6 as shown in the enlarged sectional view in FIG. 3A are inserted into plural holes 5d formed at the tactile section 5 to correspond to their respective piezoelectric element reeds 2 while keeping them mounted on free ends 2b of their respective piezoelectric elements reeds 2 at their bottom ends.

FIGS. 3A and 3B are sectional views showing the tactile sections 5 enlarged in cases of this first embodiment and a second embodiment of the present invention which will be described later. A rectangular lid-like cap 7 whose top is made of elastic material and whose bottom is made open, as shown in FIG. 4, is attached to the tactile section 5. This cap 7 is provided with through-holes 7b through which tactile tips 6a of the tactile pins 6 are projected from the surface 7a of the cap 7.

A section 5a through which the tactile pins 6 are inserted comprises small-diameter through-holes 7b reaching the surface 7a of the cap 7, and holes 5d. Upper and lower pin stoppers 5e and 5f are common to the through-holes 7b and the pins-inserting holes 5d. Each of the tactile pins 6 inserted into the pins-inserting section 5a comprises the small-diameter tactile tip 6a passed through the through-hole 7b of the cap 7, a portion 6b so different in length as to correspond to that piezoelectric element reeds 2 on which the tactile pin 6 is mounted at the lower end thereof, and a collar 6c arranged between the tactile tip 6a and the mounting portion 6b of the tactile pin 6. The tactile pins 6 are held freely movable up and down between the upper 5e and the lower pin stopper 5f by their collars 6c.

FIG. 4 is a perspective view showing how the tactile section 5 is attached to the base body 1 in the case of the first embodiment of the present invention. The base body 1 has an opening section formed in the front ends of the top 1a and the bottom 1b as shown in the left hand portion of FIG. 4. The tactile section 5 has such a structure as shown in FIGS. 4 and 5, wherein an engaging claw 5g made of elastic material is engaged with a claw stopper (not shown) in an engaged groove 1j on the top 1a of the base body 1. A fitting projection (not shown) made of elastic material is formed on the inner face of a stepped portion 5h at the tactile section 5 and fitted into a hole 1k formed at the front end face of the bottom 1b of the base body 1.

This tactile section, 5 is attached to the base body 1 in a horizontal direction as shown by an arrow in FIG. 4.